

**The Usual Suspects: Common microorganisms causing infections in the cardiovascular system.**

**Bacteria'**

**Gram-positive**

*Bacillus anthracis*

*Clostridium perfringens*

*Streptococcus pyogenes*

Other streptococci

**Gram-negative**

*Bartonella henselae*

*Borrelia burgdorferi*

*Brucella* species

*Ehrlichia* species

*Francisella tularensis*

*Rickettsia* species

*Yersinia pestis*

**Fungi**

Various

**Viruses**

Coxsackie virus

Dengue fever virus

Ebola virus

Epstein-Barr virus

ellow fever virus

Human immunodeficiency virus

**Protozoa**

*Babesia microti*

*Plasmodium* species

*Schistosoma* species

*Trypanosoma cruzi*

*Wuchereria bancrofti*;

### Case 3.1

You are at your son's baseball game when another boy's dad experiences dizziness and nearly faints in the stands next to you. You tell him that you are a paramedic and will walk him to your car where you have your medical equipment. He reports that he has had a headache off and on since he had a tooth extracted four days ago. This evening he is feeling very weak.

His blood pressure is normal. When you listen to his heart you note that he has a pronounced **murmur**. He reports having had rheumatic fever 15 years ago. You examine his fingernails and find one that has tiny **petechial** hemorrhages under it.

1. Which cardiovascular infectious condition is this?
2. What is the most likely causative organism and the route of transmission?
3. What's the connection, if any, with rheumatic fever?
4. Why did you look at his fingernails?
5. What type of culture would a physician most likely order, and why?
6. What is the treatment? Is there a way to prevent the condition?

### Case 3.2

On Christmas Eve, 2000, you were working as a clerk in a Dallas emergency room. At 3 A.m., a man and two women arrived with a screaming 6-year-old girl. The man tried to explain what was wrong, but he spoke only Spanish and you had a difficult time understanding him. The girl's mother was sobbing and you couldn't hear what she was saying. The other woman spoke a bit of English and explained to you and the nurse on duty that this was her sister's family, who had just arrived from El Salvador. The aunt did not know what was wrong with her niece but told you that the father was repeating the words for "break bone."

The nurse examined the girl and found that she had a rash and a fever of 104°F. Although the girl seemed to be in severe pain, the nurse found no bone fractures. The father, shaking his head violently, said something urgently to his sister-in-law. She interpreted his frantic statement for you. He said "it's in her blood."

1. What is your diagnosis?
2. What connection does this disease have to broken bones?
3. This is a vector-borne disease. What is the name of the most common vector?
4. What other infection is transmitted by the same vector?
5. The next night when you arrived at work the little girl seemed to be doing better. The rash had subsided and her fever had lowered. But on the third night you arrived to find that she had been transferred to intensive care after hemorrhaging internally. Is this still consistent with your original diagnosis? Explain.
6. This all sounds very bad, but you're somewhat comforted by the fact that this disease is not found in the United States, Right?

### Case 3.3

You work in a small family practice in rural Virginia. A man in his early 50s comes in with a complaint of intermittent fever (102-103° F) and headache for the past two weeks. The physician examines him and takes a history. The only clinical finding is a wound about the size of a quarter on his right thumb. **Axillary** lymph nodes are swollen and tender. The man says he cut himself while skinning a rabbit three days ago. On the basis of these observations the physician prescribes streptomycin and asks the man to call if his symptoms don't improve in three days.

The physician asks you to draw blood and tells the patient he should return in four weeks for another blood sample. She says there is no need to culture the wound.

1. On the basis of the limited information above, the physician has obviously made a diagnosis. What is it? What does it look like when Gram stained?
2. What is the most likely reservoir for the causative organism in this case?
3. Why draw blood twice?
4. Why not culture the wound to look for the bacterium?
5. What are some other common infections that humans acquire from animals? (These are also known as zoonoses).

#### Case 3.4

A 63-year-old international telecommunications executive visits your office with complaints of a high fever. The fever is not constant, but **intermittent**. When you press him for details he estimates that every three days or so he suffers these **debilitating** "sweats." He usually has headaches and muscle aches during the episodes. They keep him home from work. After half a day or so he feels better. He reports that he has experienced these episodes for about two months.

1. What is the name of the condition you suspect?
2. What should be your first question about the patient's history?
3. What is the most likely causative organism (genus and species)? Support your answer.
4. Is this pathogen eukaryotic or prokaryotic?
5. Which is the most dangerous of the species that can cause this disease? Give some details.
6. What are the two main places in the human body that are exploited by the causative organism in this disease?
7. Can this individual transmit this infection to others? Why or why not?

#### Case 3.5

You've decided to work in the Peace Corps for the first two years after graduating from nursing school. Your assignment is in a rural area in South Africa. You and a coworker are setting up a clinic and encouraging women from the surrounding villages to bring their children when they are ill and to visit the clinic themselves, especially when they are pregnant.

1. In your first week you saw several children whose major symptoms were high fever, lots of sweating, and **prostration**. They all turned out to have the same infectious condition, one that you continued to see throughout your stay in South Africa. Up to half of the sick children did not survive this illness. What is it?
2. In this setting, what is the best prevention for this disease?
3. In your third month you saw a 2-year-old boy with an angry-looking rash. He was very ill with a high fever, and eventually died. His death surprised you because you thought this disease had been conquered long ago. (In the United States it is seen only occasionally because children are vaccinated for it.) Over the course of your two-year stay you saw these symptoms in children perhaps a dozen times. Several of the children died. What is the disease?
4. Name at least two of the most common infectious conditions you should look for in adult clients in this setting.

#### Case 3.6.

A newspaper report from Boston in the late 1990s described a growing fear among local residents. They were afraid to venture outdoors because of the increasing **visibility of a particular infectious** disease. The article reported that the number of people Massachusetts had recently decreased dramatically, and that many homeowners were erecting fences and spraying their yards with pesticides. Many people who dared to venture outdoor wore white clothing and tucked and tucked their pants inside their socks. In New York, there were reports of residents simply paving over their lawns, and some people gave up gardening altogether.

Although most prominent in the Northeast, similar behaviors were seen all over the country. In Montana, 10% of people surveyed felt they were at high risk for the disease, even though the Centers for Disease Control and Prevention (CDC) said that the risk was very low in that state.

1. What infectious disease do you suppose these cautious citizens were trying to avoid?
2. What determines which geographical region of the country carries risk of this disease for its inhabitants?
3. Another major disease in the United States is transmitted in a similar way. What is it, and what microorganism causes it?
4. Which regions of the country have a high incidence of this second tick-borne disease?
5. Which of these two diseases frequently has no skin manifestations at all?

### Case 3.7. Challenge

Fred is a longtime patient in the family practice where you work. Typically he comes in once\_a year for a physical because his job involves high-steel construction work and his company requires annual checkups. However, during the past six months he has visited the office three times.

Fred first came to the office in January complaining of extreme fatigue. He had lost 15 pounds since his checkup the previous May. As part of his examination the physician ordered a standard human immunodeficiency virus (HIV) test (of the ELISA type), which came back negative. He was to come back for a repeat test in May. But he returned one month later because he was experiencing an episode of genital herpes in which the lesions had not healed in over three weeks.

The episode eventually subsided and Fred returned in May for his repeat HIV test. During this visit, he told the doctor that he was recovering from a severe respiratory infection that had bothered him for weeks. The physician drew blood; his CD4 count was 200 cells/ml. This HIV test (again, an ELISA) was also negative.

Two months later Fred was admitted to the hospital and a lung biopsy demonstrated *Pneumocystis carinii* pneumonia, but another HIV test came back negative. He was released after three weeks, but readmitted with the same infection two months later. Again he tested negative for HIV. He died three days after admission to the hospital.

1. What is an ELISA test, and what does the one for HIV actually detect?
2. This patient did indeed have HIV infection, but continued to test negative. What are some possible explanations for, the consistently negative test results?
3. Are any alternative tests available to clinicians for patients strongly suspected to be HIV-positive who test negative with the usual test?
4. Would you expect patients with lack of serum reactivity to have a fast or slow progression from HIV infection to acquire immune deficiency syndrome (AIDS)? Defend your answer,
5. Which of the reported symptoms are consistent with a diagnosis of HIV?

### Case 3.8.

You are at the beach on Lake Michigan with your friends over spring break. The house you're staying in is a few blocks away from the beach (okay - so you're on a budget!), and the flower border around the house is overgrown with weeds. There is a tiny concrete patio next to the house where the four of you crowd to lie out in the sun when you're not at the beach.

Everything is fine until Janet complains of an insect bite on her ankle. It looks like a big mosquito bite. You rummage around, the sink in the bathroom and find a very old bottle of aloe lotion. She rubs it on the bite and you both return to the patio.

The next day Janet's ankle is very red in the area around the bite. It is hot and tender to the touch. Being nursing students, you decide not to take a chance and you drive her to the emergency department to have it looked at. You wait there for four hours while other, more seriously ill patients are seen before you. It is your last day at the beach, and even Janet is beginning to feel it is not worth wasting the day in the waiting room. So leave the hospital without seeing a doctor.

You go back to the house and Janet puts more aloe lotion on the bite. Then, off you go to the lake. That night Janet's roommate wakes you at 2 AM saying that Janet is crying and sweating. When you get to her room you see that Janet looks very ill. She is covered in sweat but is shivering. She is very pale, almost blue in places, and there are red patches on her legs. You dial 911.

1. What do you suppose is happening with Janet? Is it dangerous?
2. Explain Janet's symptoms described in the last paragraph of the case.
3. What organism causes this condition?
4. When you relate the history of Janet's condition to one of the paramedics, you notice that she writes "secondary to cellulitis" on her pad of paper. What is cellulitis, and what does it mean that Janet's condition is "secondary" to it?
5. How should Janet's condition be treated at this point?